

I claim:

1. An active implantable medical device, comprising:

circuit means for detecting spontaneous atrial and ventricular events;

circuit means for providing ventricular and atrial stimulation, said atrial stimulation having an initial stimulation energy and being an adjustable stimulation energy; and

means for suspecting a loss of an atrial detection and loss of an atrial capture, comprising means for determining a sequence of events having one or more of provided stimulations and detected ventricular and atrial events, and means for analyzing said sequence to detect:

an absence of ventricular activity post-atrial stimulation,

a lengthening, beyond a given limit, of an atrio-ventricular conduction delay over a predetermined number of successive cardiac cycles,

an occurrence of an atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles,

a detection of a ventricular extrasystole,

a reduction below a given limit of a delay between an atrial stimulation and a ventricular detection, and

a passage from an atrial detection to an atrial stimulation with a concomitant reduction, below a given limit, of a delay between an atrial event and a ventricular detection.

2. The device of claim 1, wherein the suspecting means further comprises means for delivering an atrial counter-stimulation having an energy that is increased relative to said initial stimulation energy in response to a detected absence of ventricular activity post atrial stimulation.

3. The device of claim 1, wherein the suspecting means further comprises means for delivering an increase in the energy of atrial stimulation relative to said initial stimulation energy over a number of following cycles in response to detected absence of ventricular activity post atrial stimulation.

4. The device of claim 3, wherein the suspecting means further comprises means for restoring the atrial stimulation energy to the initial stimulation energy in response to a persistence of the determined lengthening of the atrio-ventricular conduction delay.

5. The device of claim 3, wherein the suspecting means further comprises means for operating a readjustment at periodic intervals of the stimulation energy level in response to a disappearance of the detected lengthening of the atrio-ventricular conduction delay, said readjustment being a lowering of said stimulation energy level.

6. The device of claim 5, wherein the suspecting means further comprises means for inhibiting said readjustment means in response to a detected increase in the said stimulation energy over a predetermined number of consecutive periodic intervals.

7. The device of claim 1, wherein the suspecting means further comprises means for increasing the atrial stimulation energy relative to said initial stimulation energy over a number of following cycles in response to a detected atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles.

8. The device of claim 7, wherein the suspecting means further comprises means for restoring the atrial stimulation energy to the initial stimulation energy in response to persistence of a detected atrial detection consecutive to an atrial stimulation.

9. The device of claim 8, wherein the suspecting means further comprises means for operating a readjustment at periodic intervals of the energy stimulation in response to a disappearance of the detected atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles, said readjustment being a lowering of said energy stimulation.

10. The device of claim 9, wherein the suspecting means further comprises means for inhibiting said readjustment means in response to a detection of an increase in the stimulation energy over a predetermined number of said consecutive periodic intervals.

11. The device of claim 1, wherein the detecting circuit means further comprises an initial atrial detection sensitivity, and the suspecting means further comprises means for increasing the atrial detection sensitivity.

12. The device of claim 11, wherein the suspecting means further comprises means for restoring the atrial sensitivity to said initial atrial detection sensitivity in response to a detected atrial stimulation inducing a nonpathological delay between atrial stimulation and ventricular detection.

13. An active implantable medical device, comprising:

circuit means for detecting spontaneous atrial and ventricular events;

circuit means for providing ventricular and atrial stimulation, said atrial stimulation

having an initial stimulation energy and being an adjustable stimulation energy; and

means for suspecting a loss of an atrial capture, comprising means for determining a sequence of events having one or more of provided stimulations and detected ventricular and atrial events, and means for analyzing said sequence to detect an absence of ventricular activity post-atrial stimulation.

14. The device of claim 13, wherein the suspecting means further comprises means for delivering an atrial counter-stimulation having an energy that is increased relative to said initial stimulation energy in response to a detected absence of ventricular activity post atrial stimulation.

15. The device of claim 13, wherein the suspecting means further comprises means for delivering an increase in the energy of atrial stimulation relative to said initial stimulation energy over a number of following cycles in response to detected absence of ventricular activity post atrial stimulation.

16. The device of claim 15, wherein the suspecting means further comprises means for restoring the atrial stimulation energy to the initial stimulation energy in response to a persistence of a determined lengthening of the atrio-ventricular conduction delay.

17. The device of claim 15, wherein the analyzing means further comprises means for detecting a lengthening, beyond a given limit, of an atrio-ventricular conduction delay over a predetermined number of successive cardiac cycles, and the suspecting means further comprises means for operating a readjustment at periodic intervals of the stimulation energy level in response to a disappearance of the detected lengthening of the atrio-ventricular conduction delay, said readjustment being a lowering of said stimulation energy level.

18. The device of claim 17, wherein the suspecting means further comprises means for inhibiting said readjustment means in response to a detected increase in the said stimulation energy over a predetermined number of consecutive periodic intervals.

19. The device of claim 13, wherein the analyzing means further comprises means for detecting an occurrence of an atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles, the suspecting means further comprising means for increasing the atrial stimulation energy relative to said initial stimulation energy over a number of following cycles in response to a detected atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles.

20. The device of claim 19, wherein the suspecting means further comprises means for restoring the atrial stimulation energy to the initial stimulation energy in response to persistence of a detected atrial detection consecutive to an atrial stimulation.

21. The device of claim 20, wherein the suspecting means further comprises means for operating a readjustment at periodic intervals of the energy stimulation in response to a disappearance of the detected atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles, said readjustment being a lowering of said energy stimulation.

22. The device of claim 21, wherein the suspecting means further comprises means for inhibiting said readjustment means in response to a detection of an increase in the stimulation energy over a predetermined number of said consecutive periodic intervals.

23. An active implantable medical device, comprising:

circuit means for detecting spontaneous atrial and ventricular events;

circuit means for providing ventricular and atrial stimulation, said atrial stimulation having an initial stimulation energy and being an adjustable stimulation energy; and

means for suspecting a loss of an atrial capture, comprising means for determining a sequence of events having one or more of provided stimulations and detected ventricular and atrial events, and means for analyzing said sequence to detect a lengthening, beyond a given limit, of an atrio-ventricular conduction delay over a predetermined number of successive cardiac cycles.

24. The device of claim 23, wherein the suspecting means further comprises means for delivering an increase in the energy of atrial stimulation relative to said initial stimulation energy over a number of following cycles in response to said lengthening of said atrio-ventricular conduction delay.

25. The device of claim 24, wherein the suspecting means further comprises means for restoring the atrial stimulation energy to the initial stimulation energy in response to a persistence of the determined lengthening of the atrio-ventricular conduction delay.

26. The device of claim 24, wherein the suspecting means further comprises means for operating a readjustment at periodic intervals of the stimulation energy level in response to a disappearance of the detected lengthening of the atrio-ventricular conduction delay, said readjustment being a lowering of said stimulation energy level.

27. The device of claim 26, wherein the suspecting means further comprises means for inhibiting said readjustment means in response to a detected increase in the said stimulation energy over a predetermined number of consecutive periodic intervals.

28. An active implantable medical device, comprising:

circuit means for detecting spontaneous atrial and ventricular events;

circuit means for providing ventricular and atrial stimulation, said atrial stimulation having an initial stimulation energy and being an adjustable stimulation energy; and

means for suspecting a loss of an atrial capture, comprising means for determining a sequence of events having one or more of provided stimulations and detected ventricular and atrial events, and means for analyzing said sequence to detect an occurrence of an atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles.

29. The device of claim 28, wherein the suspecting means further comprises means for increasing the atrial stimulation energy relative to said initial stimulation energy over a number of following cycles in response to a detected atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles.

30. The device of claim 29, wherein the suspecting means further comprises means for restoring the atrial stimulation energy to the initial stimulation energy in response to persistence of a detected atrial detection consecutive to an atrial stimulation.

31. The device of claim 30, wherein the suspecting means further comprises means for operating a readjustment at periodic intervals of the energy stimulation in response to a disappearance of the detected atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles, said readjustment being a lowering of said energy stimulation.

32. The device of claim 31, wherein the suspecting means further comprises means for inhibiting said readjustment means in response to a detection of an increase in the stimulation energy over a predetermined number of said consecutive periodic intervals.

33. An active implantable medical device, comprising:

circuit means for detecting spontaneous atrial and ventricular events;

circuit means for providing ventricular and atrial stimulation, said atrial stimulation having an initial stimulation energy and being an adjustable stimulation energy; and

means for suspecting a loss of an atrial detection and loss of an atrial capture, comprising means for determining a sequence of events having one or more of provided stimulations and detected ventricular and atrial events, and means for analyzing said sequence to detect a condition indicative of a suspected loss of atrial capture, said condition being selected from among the group consisting of:

an absence of ventricular activity post-atrial stimulation,

a lengthening, beyond a given limit, of an atrio-ventricular conduction delay over a predetermined number of successive cardiac cycles,

an occurrence of an atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles,

a detection of a ventricular extrasystole,

a reduction below a given limit of a delay between an atrial stimulation and a ventricular detection, and

a passage from an atrial detection to an atrial stimulation with a concomitant reduction, below a given limit, of a delay between an atrial event and a ventricular detection.

34. The device of claim 33 wherein the suspecting means further comprises means for delivering an atrial counter-stimulation having an energy that is increased relative to said initial stimulation energy in response to a detected condition corresponding to a suspected loss of atrial capture.

35. The device of claim 33, wherein the suspecting means further comprises means for delivering an increase in the energy of atrial stimulation relative to said initial stimulation energy over a number of following cycles in response to detected condition.

36. The device of claim 35 wherein the suspecting means further comprises means for restoring the atrial stimulation energy to the initial stimulation energy in response to a persistence of a detected lengthening of the atrio-ventricular conduction delay.

37. The device of claim 36, wherein the suspecting means further comprises means for operating a readjustment at periodic intervals of the stimulation energy level in response to a disappearance of the detected lengthening of the atrio-ventricular conduction delay, said readjustment being a lowering of said stimulation energy level.

38. The device of claim 37, wherein the suspecting means further comprises means for inhibiting said readjustment means in response to a detected increase in the said stimulation energy over a predetermined number of consecutive periodic intervals.

39. The device of claim 35, wherein the suspecting means further comprises means for restoring the atrial stimulation energy to the initial stimulation energy in response to persistence

of a detected atrial detection consecutive to an atrial stimulation.

40. The device of claim 39, wherein the suspecting means further comprises means for operating a readjustment at periodic intervals of the energy stimulation in response to a disappearance of the detected atrial detection consecutive to an atrial stimulation over a predetermined number of successive cardiac cycles, said readjustment being a lowering of said energy stimulation.

41. The device of claim 40, wherein the suspecting means further comprises means for inhibiting said readjustment means in response to a detection of an increase in the stimulation energy over a predetermined number of said consecutive periodic intervals.

42. The device of claim 33, wherein the detecting circuit means further comprises an initial atrial detection sensitivity, and the suspecting means further comprises means for increasing the atrial detection sensitivity.

43. The device of claim 42, wherein the suspecting means further comprises means for restoring the atrial sensitivity to said initial atrial detection sensitivity in response to a detected atrial stimulation inducing a nonpathological delay between atrial stimulation and ventricular detection.